

Coatings
Corrosion
Fracture and Mechanical Testing
High Temperature Mechanical Properties
Hydrogen Production and Storage Materials
Hydrogen Separation Materials
Irradiation
Materials Validation
Microstructure and Physical Properties
Modeling
Neutron Radiography
Nondestructive Evaluation
Post-irradiation Examination
Synthesis and Processing of Novel Materials
Welding and Joining
X-Ray Radiography

Post-irradiation Examination

Capabilities/Facilities

Hot Fuel Examination Facility (HFEF), Electron Microscopy Laboratory. HFEF is a large hot cell facility designed for post-irradiation examination of fuels and materials. It has equipment for machining specimens, metallographic sample preparation, scanning electron microscopy and density and dimensional (swelling) measurements. HFEF also has a great deal of fuel-specific equipment. Typically, materials are received in HFEF and evaluated

macroscopically prior to size reduction and transfer to the Electron Microscopy Laboratory for detailed microstructural evaluation.

Materials

Irradiated steels and ceramics.

Scientific/Engineering Issues

Microstructural evolution under irradiation; irradiation-induced property degradation including embrittlement, irradiation-assisted stress corrosion cracking and material swelling mechanisms.

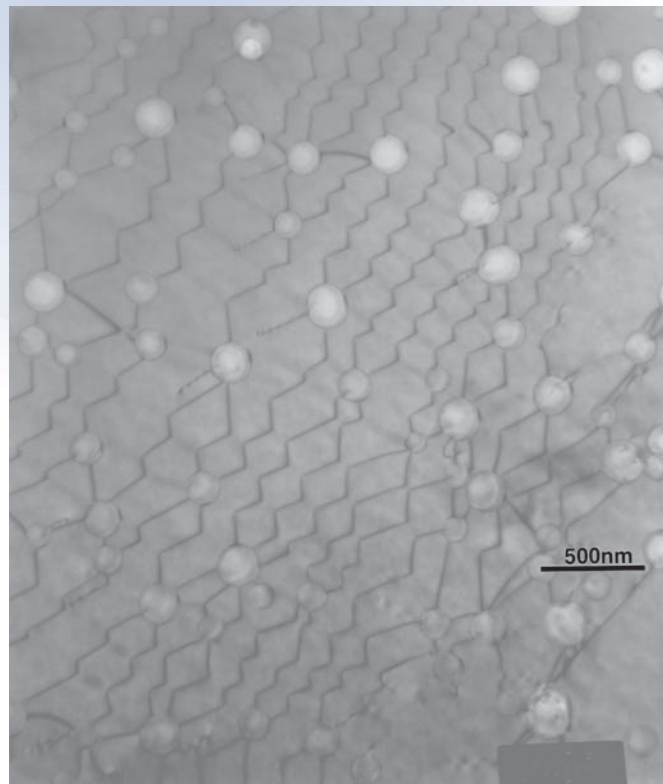
Staff

J.I. Cole, J. Gan,
T.P. O'Holleran, R. Wisener.

Recent Projects

- Development of alloys with improved radiation resistance for DOE's Nuclear Energy Research Initiative
- Development of Gas Fast Reactor materials for DOE's Generation IV nuclear reactor
- Evaluation and development of materials for Generation IV supercritical water reactors for DOE's International Nuclear Energy Research Initiative
- Understanding deformation and fracture behavior in irradiated structural stainless steels for nuclear energy plant optimization
- Assessing long-term radiation effects in EBR-II structural hardware, an Argonne National Laboratory/Japan Nuclear Cycle Development Institute collaboration

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Transmission electron micrograph of helium bubbles on a dislocation array in alpha irradiated aluminum.

Science

INL
Idaho National
Laboratory

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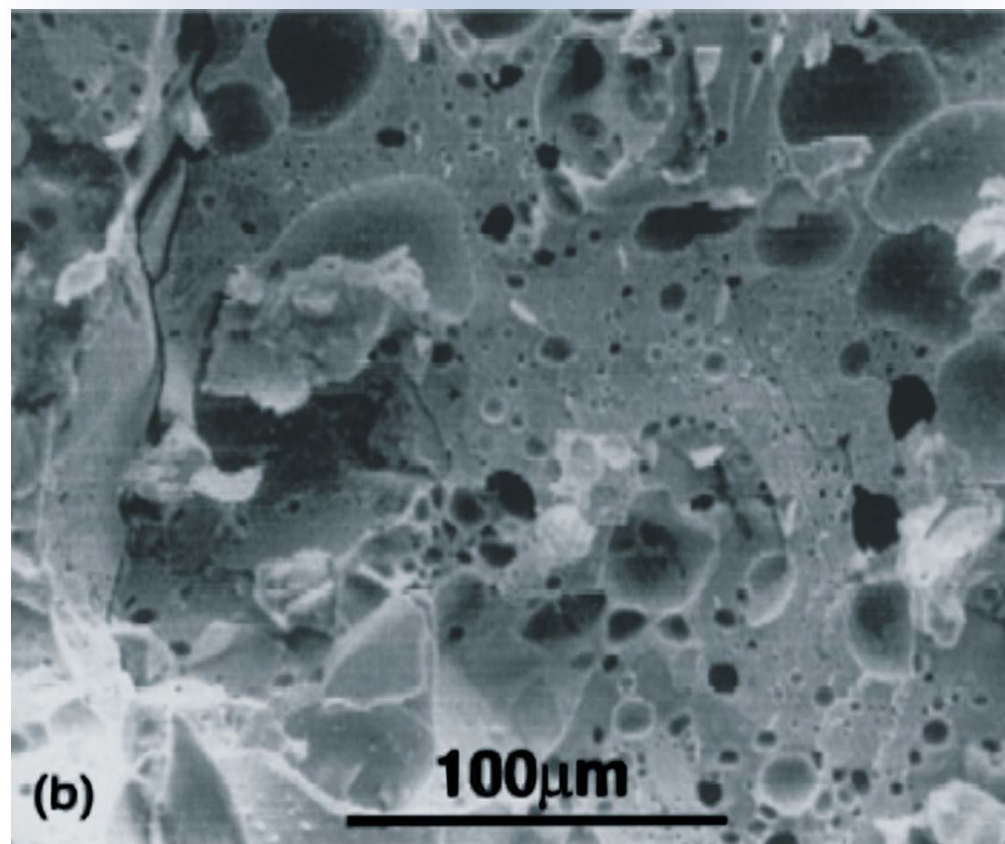
Collaborations

Japan Nuclear Cycle Development Institute collaboration on assessing long-term irradiation effects in EBR-II structural hardware.

Publications

“Irradiation Behavior of U₆Mn-Al Dispersion Fuel Elements,” M.K. Meyer, T.C. Wiencek, S.L. Hayes, G.L. Hofman, *Journal of Nuclear Materials*, Vol. 278, p. 358, 2000.

“Irradiation Behavior of U-Nb-Zr Alloy Dispersed in Aluminum,” M.K. Meyer, G.L. Hofman, T.C. Wiencek, S.L. Hayes, J.L. Snelgove, *Journal of Nuclear Materials*, Vol. 299, p. 175, 2001.



SEM micrographs of fuel fracture cross sections showing fission gas bubbles.